

Serial No.:  
 Inventor: M. Bowman et al.  
 Docket No.: 134195-1  
 Attorney: P. Patnode  
 Atty's Tele. No.: (518) 387-5286

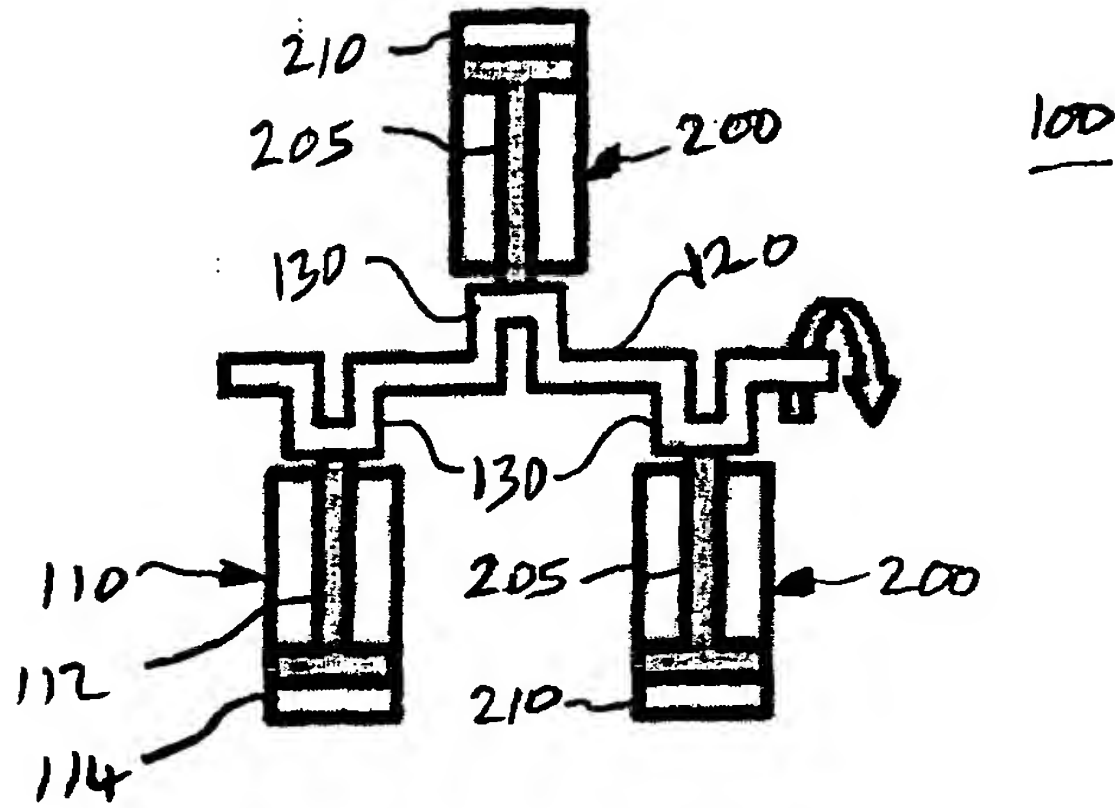


Fig. 1

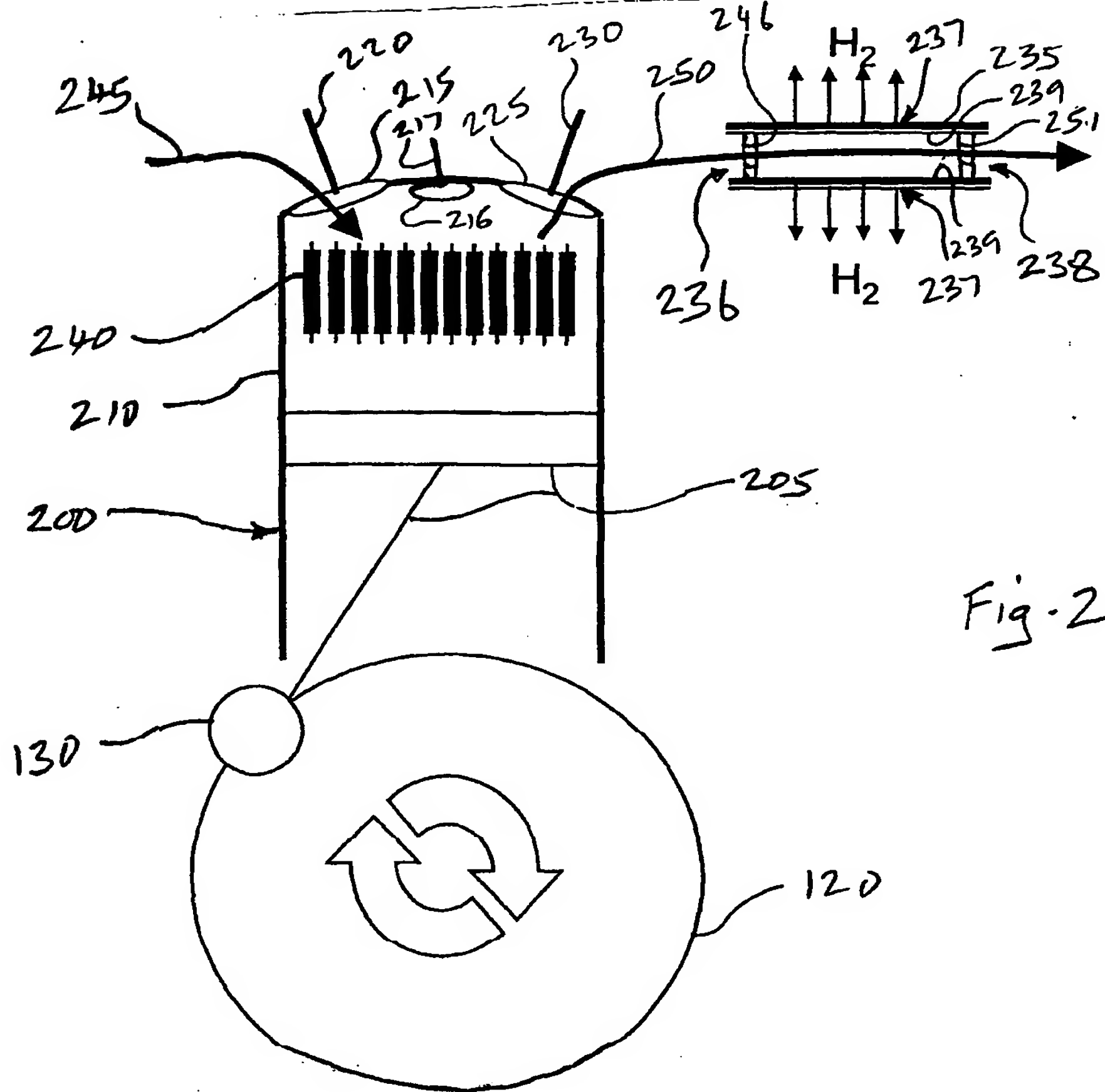


Fig. 2

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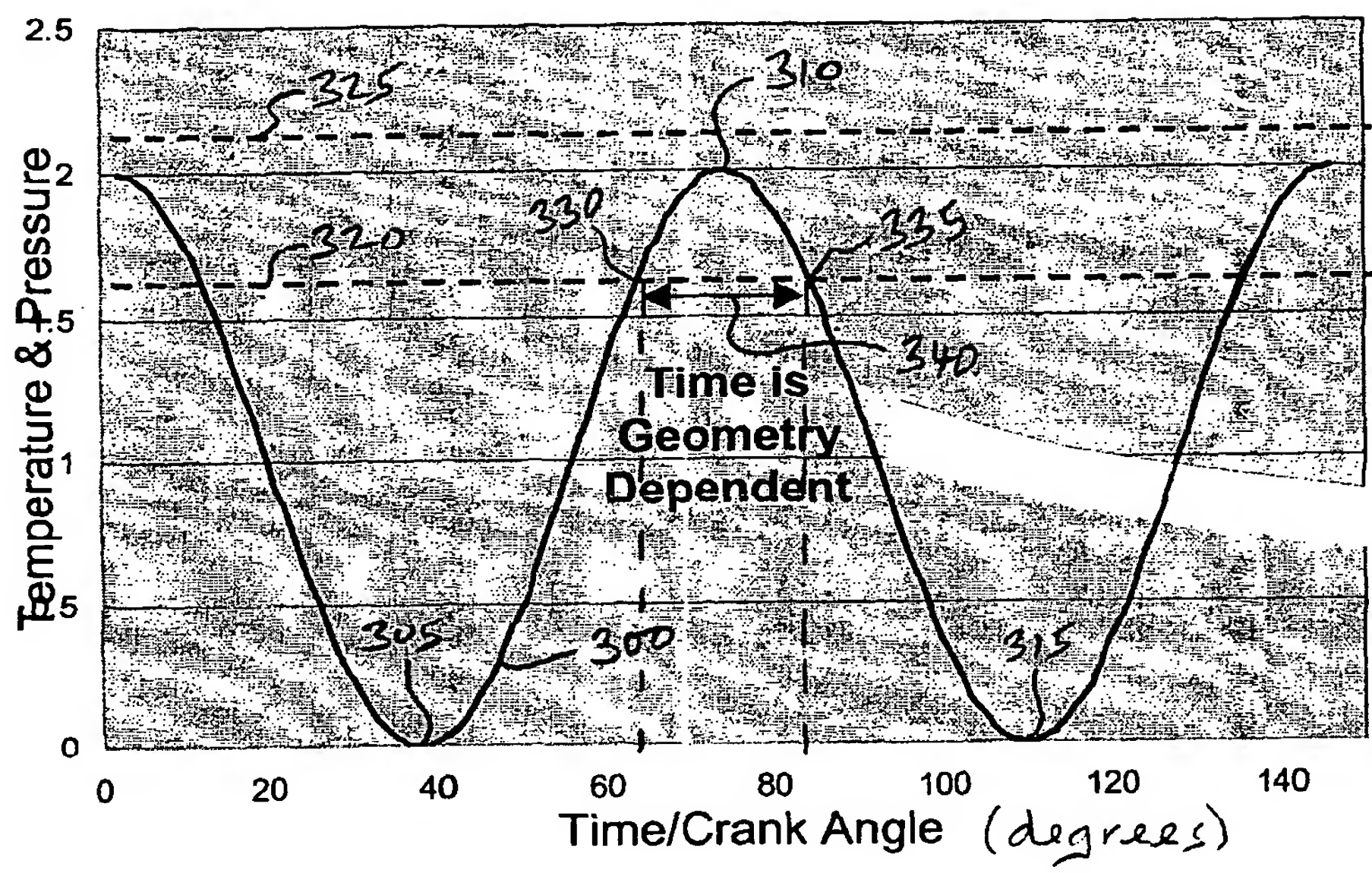


Fig. 3

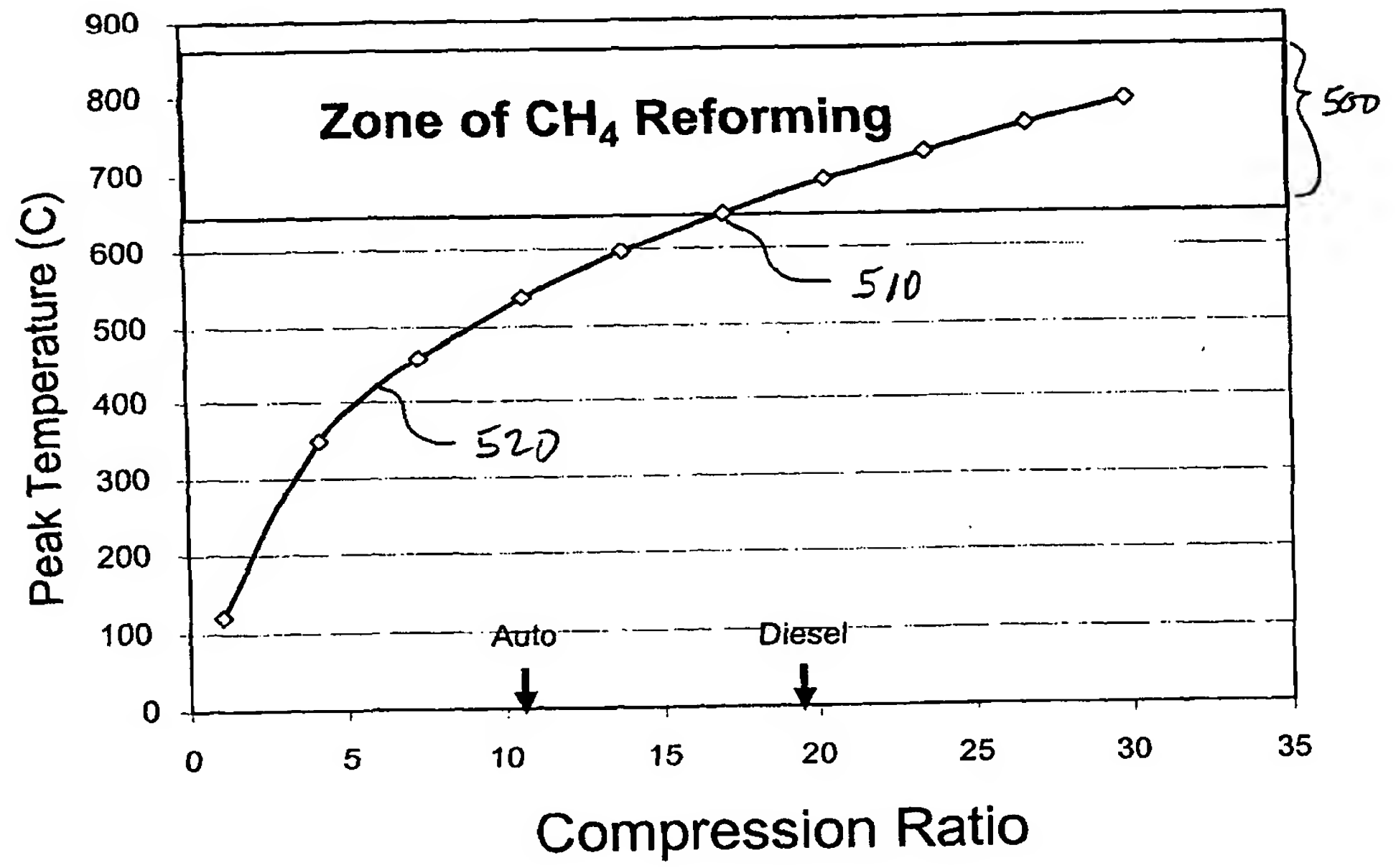


Fig. 5

The diagram illustrates a process for producing hydrogen gas from methane and water. The process involves several stages and energy flows:

- Inputs:** Methane ( $\text{CH}_4$ ) at  $(T_1, P_1)$  and Water ( $\text{H}_2\text{O}$ ) at  $(T_1, P_1)$  are fed into the process.
- Heating:** The inputs are heated by energy inputs  $E_1$  and  $E_2$  to reach intermediate states  $(T_2, P_2)$ .
- Mixing:** The heated methane and water are mixed in a unit labeled "CCC".
- Compression:** The mixture is compressed by energy input  $E_3$  to reach state  $(T_3, P_3)$ .
- Adiabatic Equilibrium:** The mixture undergoes an adiabatic equilibrium process to reach state  $(T_4, P_4)$ .
- Separation:** The mixture is separated into two streams: one containing  $\text{CH}_4, \text{H}_2, \text{CO}, \text{CO}_2, \text{H}_2\text{O}$  at  $(T_8, P_8)$  and another containing  $\text{H}_2$  at  $(T_6, P_6)$ .
- Offgas:** The  $(T_8, P_8)$  stream is further processed to produce offgas.
- Final Product:** The  $(T_6, P_6)$  stream is further processed to produce hydrogen gas ( $\text{H}_2$ ) at  $(T_7, P_7)$ .
- Energy Flows:** Energy flows are labeled  $E_1$  through  $E_9$ , representing various heating and compression steps.
- Formula:** The process energy is defined as  $E_{\text{Process}} = \sum_{i=1}^N E_i$ .

Fig. 4